Electronic Monitoring Audit Model Program

Reviewer Guidance Document

NOAA Northeast Fisheries Science Center and Fisheries Greater Atlantic Regional Fisheries Office

Video Review Protocols for Multispecies Sector Trips

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Introduction:

Electronic Monitoring (EM) refers to the use of technologies, such as video cameras, gear sensors, and reporting systems, to monitor fishing operations, effort, and/or catch. In 2010, NMFS implemented Amendment 16 to the groundfish FMP and established annual catch limits and accountability measures for the fishery. Amendment 16 also included a requirement for groundfish sectors to implement and fund an at-sea monitoring (ASM) program, and regulations allow sectors to use EM to satisfy their catch monitoring requirements. The Greater Atlantic Region is assisting with the development of two EM models in the Greater Atlantic Region: the audit-model and the maximized retention model. This Guidance Document focuses on the Audit Model review requirements.

The New England Fishery Management Council developed Amendment 23 to the groundfish FMP. Amendment 23 is intended to adjust the groundfish monitoring program to improve the reliability and accountability of catch reporting in the commercial groundfish fishery, and to ensure the monitoring program is providing accurate catch information.

The New England Fishery Management Council adopted Amendment 23 to the Northeast Multispecies Fishery Management Plan at its September 2020 meeting. The measures approved in the amendment include higher levels of monitoring (i.e., 100 percent, contingent on available funding) and approval of both the audit-model and maximized retention model as optional tools to meet monitoring requirements. Amendment 23 will be submitted to NOAA Fisheries for review, and will not be an obstacle to proceeding with electronic monitoring in the Northeast groundfish fishery. Following final action, NMFS must determine that the action is consistent with all applicable law, as required by the Magnuson-Stevens Fishery Conservation and Management Act. The target date of implementation of approved monitoring measures is May 1, 2022. However, beginning in May 2021, sectors can elect to use EM as their monitoring tool, specifically the Audit Model Program. Coverage rages will remain at ASM levels until AM 23 is implemented.

The audit-model EM program is in its fifth year and includes approximately 20 participating vessels using a variety of gear types. Under the audit-model EM program, participants must record the estimated weight and count of all discards on an eVTR and adhere to catch handling protocols at sea to ensure collection of discard data from the video footage. In particular, participants must hold all groundfish below the minimum fish size under a camera prior to discarding them to facilitate video review by a third-party EM service provider. NMFS audits a subset of trips taken by each participating vessel and compares the discard data submitted by the third-party EM service provider to the eVTR submitted by the vessel. If the data reported on the two sources match within an established threshold, NMFS uses the discards that the vessel captain reported on the eVTR for catch accounting. If the data reported on the two sources do not match within an established threshold, NMFS does not use the discards reported on the eVTR, and either uses the EM data or an estimate based on previous trips.

Operational EM programs have core standards that must be consistent among providers, and between providers and NMFS reviewers, including: reviewer training, data elements, species identification protocols, length measurement and weight estimation techniques, documenting events, documenting video quality, and reviewing procedures. Secondary reviews, when the video is reviewed and annotated by NMFS staff, are conducted as a quality control of the service

provider. Completed trip file records submitted by each reviewer are then compared. Based on criteria such as species counts, discard weights, image quality, system performance, and vessel performance suggestions are made to improve the data collection process and provide feedback to providers.

In order to provide data that can be meaningfully compared both among EM service providers and between NMFS and service providers, data must be collected using a standardized methodology. The purpose of this document is to provide guidance to video reviewers on items related to species identification, methods for obtaining lengths and weights, assigning an end disposition to the discards, and event documentation. This document also provides an overview of the general catch handling protocols for participating vessels and description of events. See appendix A for definitions of exempted fishing permit (EFP), Vessel Monitoring Plans (VMP), and multispecies Annual Catch Entitlement (ACE).

This reviewer document is not vendor specific, it provides guidance that applies to the Audit Model Program. Essentially, the goal of this document is to provide EM reviewers working for NMFS as well as outside company's cohesive instructions on how to review an EM trip. The goal in establishing these guidelines is to both provide data sets that can be compared for research and as a means for evaluating the performance of EM review companies. This document should be actively referenced by new reviewers and veteran reviewers alike. Should discrepancies between review methods become apparent it is the responsibility of the reviewer to alert NMFS staff so that a preferred method for handling discrepancies can be determined and documented here.

Common acronyms:

EM: Electronic Monitoring	**GARFO**: Greater Atlantic Regional Fisheries Office
eVTR: Electronic Vessel Trip Report	**NMFS**: National Marine Fisheries Service
ITIS: Integrated Taxonomic Information System	**NEFSC**: Northeast Fisheries Science Center
JSON: JavaScript Object Notation	**TDQ**: Training and Data Quality Branch
VMP: Vessel Monitoring Plan	**FMRD**: Fisheries Monitoring and Research Division
NEFOP: Northeast Fishery Observer Program	**ACCSP**: Atlantic Coastal Cooperative Statistics Program
ASM: At-Sea Monitor	**ACE**: Annual Catch Entitlement

Reviewer IDs:

Reviewers will be given a NMFS observer program identification number. These reviewer IDs will be used to identify which reviewer performed the primary review.

Trip Level Elements:

A trip is defined as Port-to-Port deployments. The captain is required to submit a VTR when the vessel returns to port for any reason (weather, mechanical failure, partial off-load, etc.). In the situation where a vessel returns to port, does not offload, and returns to sea to fish, the captain would be required to submit VTRs for the two distinct fishing trips.

Catch accounting EM vessels will need to process all discards prior to ending a trip. A reviewer should verify sail and land dates within the video to the trip dates listed in the FMRD Portal. These dates need to match in order for the API to accept the trip. Sail and land times are not required to be entered by the reviewer.

If reviewers notice any discrepancy with sail and/or land dates and the dates showing in the video, please notify the EM Lead to make sure trip dates are correct and accurate.

Vessels are required to have a functional EM system for the duration of the trip. A functional EM system is defined as a system that continuously records activity on deck onto a hard drive or other suitable video storage device. The EM system consists of the control box, GPS sensors, and the cameras. The captains are required to turn the EM system on before departing a dock or mooring, keep the system running for the entirety of the trip and wait to turn it off till after they land at a dock/mooring.


```
{
  "review_id": 1245,
  "vessel_permit_number": 222222,
  "vessel_name": "Vessel B",
  "date_sail": "2020-06-29",
  "date_land": "2020-06-31",
  "evtr_num": 22222220062901,
  "total_hauls": 9,
  "reviewed_hauls": 9,
  "observed": "Y",
  "comments": "string",
```


Figure 1: Example of a trip object in JSON format.

Observed Y/N:

The trip level OBSERVED field is used to indicate if the trip was observable dock to dock, as required. When there are instances that prevent the entire trip from being observed, enter OBSERVED=N at the trip level. These instances can include, but not limited to, if the system is not activated or shut off improperly, if video gaps are present, or if there is a camera or system failure. A trip can be OBSERVED =N and still have all the hauls marked OBSERVED =Y.

Review Start and Stop Definitions:

Currently, there are no annotation requirements for review start or stop. However, a reviewer should verify the start and end of a trip are on video.

Review Start: The reviewer should make sure the vessel is at a dock or mooring prior to departing with the intent of going fishing. If the reviewer cannot determine or track the departure location and the system is activated while underway, an EMS-SYSTEM NOT ACTIVATED AT DOCK event should be annotated. The camera system must be activated by the captain prior to departure and a system check should be conducted to ensure the system and cameras are functioning properly.

Review Stop: In EM for catch accounting, review should continue until all discards are measured and all catch is fully processed or when the vessel lands with the intent to off-load their catch, whichever occurs last. If discards are collected during a haul but are not measured and the vessel lands and begins off-loading, the reviewer should continue watching the video to confirm all discards are processed. If video ends prior to being able to fully account for discards, an EMS-SYSTEM OFF PRIOR event should be annotated.

General Gear Categories:

There are currently four groundfish and two non-sector gear categories operating in the EM programs. Each trip will have a primary gear used and possibly secondary gear used. EM gear codes will align with codes established by the Atlantic Coastal Cooperative Statistics Program. The ACCSP is the data warehouse for the Atlantic states and works to standardize data sets among federal and state fishery programs. Gear category definitions and ACCSP codes can be found in Table 1.

Some vessels use multiple gear categories on the same trip. The most common multi-gear scenario is a combination of a handline/auto-jig and either gillnet or longline gear. A common scenario we observe is that vessels may test the waters with the handline before setting out the gillnet or longline gear.

If a gear not found in Table 1 is used, there is no requirement to document the haul activity, discards or events. Once a gear found in Table 1 is seen being hauled, the reviewer will resume annotation described in this manual. The target species does not need to be groundfish if one of the gears below is hauled/fished. If groundfish are caught using one of these gears, the captain is required to process those discards accordingly.

Table 1: Gear Category definitions and ACCSP Codes - Groundfish

Gear Type	Definition	ACCSP Category	ACCSP GEARCATCD
Otter Trawl, Bottom	A funnel shaped net that is towed along the ocean bottom, behind one boat. Large doors deployed to aid in keeping the net on the bottom	Trawls	091

Gillnet	One net or a series of nets tied together between a weighted leadline and floatline creating a vertical barrier of netting in the water column.	Gill Nets	200
Longline	Fishing gear that is or is designed to be set horizontally, either anchored, floating, or attached to a vessel, and that consists of a main or ground line with three or more gangions and hooks.	Long Lines	400
Handline/ AutoJig	Long section of line that is spooled on a reel. Generally will have a weight attached to a swivel towards the end of the line, with a shorter piece of line attached to a hook or a jig. The hook may be baited or fish shaped lures may be used.	Hand Lines	700

Haul Definitions by Gear Category:

Currently vessels participating in an EM program fish with a variety of gears. Depending on the gear being used by fishermen on a trip that is selected for review, there are slightly different definitions of what is considered a 'haul' for EM data collection. The haul definitions used by EM will mimic the ASM program's gear specific definitions.

Below is how to document the different haul time elements for each gear. For all approved gears, a date, timestamp, and GPS coordinates should be created for each of the given elements within the haul. The reviewer should do his/her best in determining when each element occurs.

There may be instances where a haul element or series of elements cannot be annotated. Reasons may include missing video or the imagery is too corrupt to verify activity during that period of time. If one or more haul elements cannot be collected, for whatever reason, leave it blank or null and add a comment to the haul stating what occurred and why. DO NOT create a false annotation just to have a date/time entered.


```
{
    "haul_id": 1,
    "gear_category": "091",
    "start_haul_datetime":
"2019-08-02T16:24:45.000Z",
    "start_haul_lat": 42.123456,
    "start_haul_lon": -67.123456,
    "end_haul_datetime":
"2019-08-02T16:24:45.000Z",
    "end_haul_lat": 42.123456,
    "end_haul_lon": -67.123456,
    "delayed_catch_process": "Y",
    "observed": "Y",
    "comments": "string"
}
```


Figure 2: Example of a haul object in JSON format

While hauling gear or immediately proceeding a haul there is generally a period of catch processing. It is important to also review the catch processing period because the vessel may decide to discard fish originally marked as kept. For trawl vessels, this period occurs after haul back, when the net has been pulled from the water and the catch is dumped on deck. For gillnet/longline and handline/jig vessels, the catch processing can occur during gear retrieval but will likely continue after the haul has ended and the entire string is onboard. At this time fish are

typically being gutted and stowed and discarding can occur as the quality of the fish is examined. No annotations are required indicating when processing has ended, but it is expected the reviewer watches all catch processing for possible discarding events.

Bottom Trawl:

HAUL_BEGIN: First component of net deployed, i.e. net hits the water.

HAUL_END: Hauling equipment put into gear with the intention of hauling back.

- Note: If the hauling equipment (i.e. wenches) are not in view, the reviewer will use the wire from the wenches to the trawl doors as the indicator of Haul End. When using the wire, look for rope or colored markings, as those will be most visible when the wire is in motion. Captains typically put depth markings on the wire that are visible on video. If the wire is not visible, the reviewer can mark the Haul End as when the trawl doors are fully up alongside the vessel.
- If the trawl net is deployed but not fished (i.e. doors not set out, net partially on reel, codend cleated to the side of the vessel), this is *NOT* a haul. The captain is cleaning the net with no intention to deploy it fully. No annotations are required for this type of event.

Gillnet or Longline:

HAUL_BEGIN: Hauling equipment put into gear or retrieval of gear commences.

HAUL_END: When the last piece of the surface system (highflyer or buoy) is brought on board.

- Note: If the highflyer/buoy is left in the water floating beside the vessel, the haul will end when the line is cleated. The vessel will likely set the same gear immediately and therefore not bring the gear completely onboard.
- If a gillnet string or a longline's mainline is broken/severed at any point and the vessel immediately retrieves the other end of the string and continues the haul, this would be considered one (1) haul. The second half of the string will only have one surface system (highflyer/buoy) and is a good indicator of a broken string. If another string is hauled in between the broken string, a new haul is created and the broken string would be counted as two (2) hauls.

Handline or Auto-Jig:

HAUL_BEGIN: Do not record haul begin information for handline gears.

HAUL_END: When all rods are stowed and fishing has ceased. Vessel has started to steam home and the deck is being cleaned.

- During the haul, the vessel can pick up gear and steam around in search of fish. All jigging activity should be accounted for as one (1) haul.
- If the captain hauls another gear type, the jig haul would end and a new haul would begin with that new gear. A new haul is *NOT* created if gear is being set (i.e. longline or gillnet) and the jig(s) is still on deck with the intent of continuing being fished. If another rod/reel/jig is added to the current set being fished, this DOES NOT constitute another haul, but a continuation of the current haul.

Haul Level Elements:

Observed Y/N:

Definition: Were all discard events in the haul viewable such that they could be adequately annotated by a video reviewer. "Adequately annotated," is defined as identification to lowest taxonomic level possible and appropriate weight estimation (length measurement, tally, subsampling, visual estimate). If video cuts out, is missing, or obstructed and the catch cannot be tracked confidently to determine end disposition, then that haul would be unobserved.

Purpose: Indicates all discards were accounted for on the haul.

A haul is OBSERVED=Y when the reviewer can adequately annotate discards within that haul. A haul is OBSERVED=N when discards cannot be accounted for or tracked. Issues that may lead to discards not being trackable include, but are not limited to, video gaps, camera or system failure, bulk discarding, slipped or tripped bag, and system image impairment issues. The appropriate EM or Crew Specific event should be created. This indicates the reason(s) the haul was unobserved and corrections can be made and feedback provided to the vessel. For the types of Crew or EM Specific Events, see the Documenting Event Standards section.

The reviewer will review and annotate all video, hauls, and discards regardless of whether the haul will be OBS Y or N. The ability to track discards may be impacted but the video should still be reviewed. The reviewer should do his/her best at documenting discards when issues arise (improper catch handling, system image impairment issues, etc.).

Delayed Catch Processing Y/N:

Vessels may elect to process their groundfish discards immediately as each animal is encountered; or process discards at the end of the haul after sorting is completed; or process discards together after several hauls. This last example is referred to as Delayed Catch Processing (DCP). Vessels are required to process discards upon changing statistical area, gear, or mesh within the trip, and prior to landing at a dock with the purpose of off-loading. A reviewer is still required to annotate each haul accordingly, if discard processing occurs or not. If multiple hauls occur with no catch processing performed after each haul the reviewer will annotate all discards on the haul where they are processed. Reviewers will check DCP = Y for each haul when discards are retained but are not processed. If discards are processed or none are seen being stowed, the reviewer will check DCP=N.

DCP instructions will be included in VMPs for vessels that are electing to utilize this operational plan. If DCP is applied during a trip, the reviewer must confirm that groundfish discards were stored at the designated area on deck and retained within camera view.

The captain must elect to use DCP for the entire trip. If the vessel is seen not retaining discards within a designated area or are stored out of view or the vessel is not retaining all groundfish discards throughout hauls documented as DCP, the reviewer should annotate a CSE-IMPROPER DCP event.

The processing of discards refers to the placing of fish on the measuring board appropriately as described in their VMP. Fish may still be discarded during the haul (Fish NK, drop-offs, etc.).

Annotations of these discards do not impact the Y or N of this field.

This field will be used to indicate which haul discards were caught and if they were processed on that haul. When discards are post-processed by the Center for quota management, they will be parsed out to each haul where DCP=Y is annotated, similar to the cumulative sum estimation method at-sea observers use. A haul with DCP=N, will signify that discards were processed or that no discards were seen for that particular haul.

Catch Handling Protocols:

Fish caught in the Multispecies Groundfish fishery can fall into three categories: allocated species, regulated species and species that do not have sector allocations and are non-groundfish. See Table 2 for a list of the groundfish species and which categories these species belong to. The EM program will focus on the groundfish species listed. Reviewers should have access to the current VMP while reviewing trips and large deviations from the approved catch handling behavior should be noted in the review data.

As specified in the VMP, vessels participating in the catch accounting EM program will have a designated area for processing and measuring allocated groundfish species discards and non-allocated groundfish species on deck (See Appendix B for vessel reference). Vessel participants are allowed to land one (1) Atlantic Halibut per trip. Any upgrading (discarding a smaller, previously caught Halibut in favor of a larger one caught on a subsequent haul) will be clearly visible to the reviewer and occur within camera view. A catch entry of the discarded Halibut should be made at the time of discarding with a comment stating 'UPGRADED'. If the haul of when the fish was caught is known, include it in the comments as well. Catch handling procedures will be documented in the VMP of each vessel and will vary slightly depending on the gear used by the vessel, the catch composition and the processing workflow (e.g., if the vessel has a conveyor).


```
"discard_events":
    [{"haul_id": 1,
      "species_common_itis": "COD, ATLANTIC",
      "species_code_itis": 164712,
      "weight": 1.5,
      "catch_weight_uom": "LB",
      "length": null,
      "catch_length_uom": "CM",
      "count": 1,
      "weight_determined_by": "VISUAL",
      "discard_datetime": "2019-08-02T16:24:45.000Z",
      "discard_lat": 42.123456,
      "discard_lon": -67.123456,
      "disposition": "031",
      "reviewer_id": "X99",
      "comments": "string"}]
```


Figure 3: Example of discard annotations in JSON format.

Animals that are placed with kept catch or taken out of camera view for extended periods of time during hauling, sorting, or measuring phases of fishing effort should be considered as retained catch.

Fishermen are instructed to place individual catch items along the measuring strip and smooth out the fish if it is curled or aligned with the grid if off center. Once the fish is placed accurately the fisherman will momentarily ensure an unobstructed view of the fish by removing his or her hands from the vicinity of the catch item and measuring grid. The reviewer should use his/her best judgment if a length can be obtained or not when a fish is not perfectly

placed on the strip or hands are partially on the fish. Finding the exact frame where a fish is unobstructed may require rewinding or forwarding the video. If a length cannot be obtained an entry should be made with LENGTH = NULL, ESTMETHCD=VISUAL and enter in the visually estimated weight.

Species Identification Standards:

While sorting catch on a catch estimation trip, any of the 13 federally regulated groundfish species that the captain does not intend to land for market must be retained on board for catch accounting and length measurement processing before returning discards to the water. Vessels are allowed to discard non-regulated catch without passing them across the measuring strip, however all discarding must occur at designated control points as illustrated in the vessel's VMP.

The reviewer should make every effort to identify a catch item to species level (Table 2). For instances when a catch item cannot be identified to species or family, heed the following guidance:

When an identification cannot be determined and the reviewer is confident the item is a fish species (groundfish or non-groundfish), the reviewer will make an annotation of FISH NK, ESTMETHCD= UNKNOWN. FISH, NK should be designated to target level species, or any marketable species that is federally managed under a fishery management plan. Examples of a FISH NK include groundfish that cannot be identified to the species, fish that could be a target species (i.e. a flounder of similar size to an ACE species but not a large animal) or fish that cannot be identified at all (i.e. a blur being tossed over, water drop over fish). Entries of identifiable non-groundfish should NOT be included in any FISH NK catch entry, unless otherwise stated in this document. Entries of FISH NK should be limited to any unidentifiable fish discards.

If the reviewer sees a catch item but cannot determine if it is a fish, shark, or protected species, a catch entry should be made using VERTEBRATE UNCLASSIFIED and ESTMETHCD=UNKNOWN. When applicable Event entrie(s) should be made for fish that could not be identified. Examples of a VERTEBRATE UNCLASSIFIED would be if a large object is seen in the net, but the image quality or the views are not adequate enough to give it a classification. Actions of the captain can also aid in this entry if he/she is seen leaning over the rail and shaking the net and a splash is seen. Entries of VERTEBRATE UNCLASSIFIED should be used for anything unidentifiable that is entangled in the gear, falls from the gear, or is brought on deck.

The reviewer should be able to eliminate and exclude species based on what is visible. The reviewer should take the time to make sure the fish cannot be identified and that any non-groundfish species have been ruled out.

There are a handful of hake species encountered by fishermen participating in the Multispecies Groundfish Fishery. Many of these hakes are difficult to distinguish morphologically in person and from video footage. Because White Hake is a regulated groundfish species that are difficult to differentiate from other dorsally-filamented hake (red and spotted hakes), clearly documenting all of the individuals from these hake species is important for generating accurate estimates of the catch of White Hake. During the haul, the reviewer should tally ALL dorsal-filamented hake (i.e. white, red, and spotted hakes), regardless if a review can identify the individual to species

using additional morphological characters (e.g., dashed lateral line of the spotted hake is visible). At the end of the haul, one (1) annotation of HAKE, RED/WHITE, MIX will be made with the UNIT_COUNT filled out with the total number of dorsal-filament hake species for the haul, this entry does not include hake that are measured. Individuals that can be positively identified as Silver Hake or Offshore Hake should NOT be included as part of this tally because they are non-groundfish species (i.e., species that can be discarded without catch entries). See the tally count subsampling section below for more details.

The only time White Hake should be noted is when they are discarded as 031 - POOR QUALITY. In these cases individuals are typically larger and easy to identify as White Hake, but are often damaged. An entry will be made for White Hake, with a visual estimated weight and categorized as 031 - POOR QUALITY. See the Documentation of Fish Disposition section for more details.

In addition to correctly identifying the species, a video analyst should be able to exclude similar species. A quick reference guide to species characteristics for regulated groundfish can be found in Appendix C.

Species Verification Program:

Starting in Fishing Year 2021, species verification will adopt a more organized format. Reviewers will be required to take quarterly identification assessments, via the internet, that cover the 13 federally managed groundfish species that EM accounts for (Table 2). These assessments will be used to verify that EM reviewers can consistently identify groundfish to species. The details of this process are still in development. This section will be updated when it is finalized.

Table 2: Federally managed groundfish species of the northeast multispecies complex.

Groundfish Species of the Northeast		
Common name	*'Allocated'*	*'Regulated'*
Atlantic cod	Yes	Yes
Haddock	Yes	Yes
Pollock	Yes	Yes
White hake	Yes	Yes
Atlantic halibut†	Yes	Yes
Winter flounder	Yes	Yes
American plaice flounder	Yes	Yes
Yellowtail flounder	Yes	Yes
Redfish	Yes	Yes
Witch Flounder	Yes	Yes
Ocean pout*	No	Yes
Windowpane flounder*	No	Yes
Atlantic wolffish*	No	Yes

* Regulations prohibit retention, † Regulations allow the retention of a single individual, upgrading possible

Protocols for Obtaining Lengths:

To turn image data into weight estimates fishermen place specimens on measuring boards (to produce lateral images of each fish directly on the board). Measuring boards are installed on deck and the view from at least one camera is focused on this 'measuring station'. Estimates of a catch item's length should be recorded in whole centimeters, with reviewers rounding to the nearest whole centimeter (i.e., round down when the estimate is less than 0.5 centimeters and up when the estimate is equal to or greater than 0.5 centimeters). Measuring standards follow current observer program's measuring protocols.

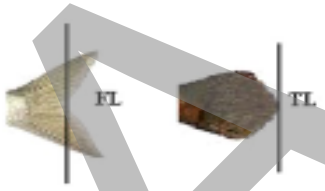
Reviewers will estimate a length in whole centimeters for *each* regulated groundfish species that is processed on the measuring strip and discarded on an EM multi-species trip. If a regulated groundfish species is placed on the measuring strip, but is seen being retained, no entry is required. In cases where the reviewer is uncertain if an individual fish is kept or discarded, the reviewer will make an annotation to species with the DISPOSITION= 900 UNKNOWN KEPT OR DISCARDED. Atlantic wolffish are exempted from length measurements and can be discarded without being placed on the strip. Make an annotation of WOLFFISH, ATLANTIC, LENGTH = NULL, DISPOSITION=099, ESTMETHCD=VISUAL and enter in the visual weight. A length measurement can be collected for Atlantic wolffish that are placed on the measuring board.

Generally, species length estimates represent a total length, however, for species with forked caudal tails, a fork length estimate should be recorded instead. Appropriate length estimates for each regulated species are illustrated in Table 3. The parameters used in length to weight conversion for each species can be found in Wigley et. al (2003). Some species exhibit seasonal variation in the parameters that best describe this length to weight relationship (related to spawning and other seasonal changes in body condition), and for these species subtly different parameters should be applied depending on the season they are caught (see Appendix F). While annotating catch data, reviewers should inspect each animal to ensure that it is whole and intact. Lengths should not be collected from groundfish that are missing body parts, reveal signs of significant predation, gear damage, or decomposition.

Table 3: Length types for groundfish species

SPECIES	LENGTH TYPE	SPECIES	LENGTH TYPE
COD, ATLANTIC	*FL*	*HADDOCK*	*FL*
FLOUNDER, AM. PLAICE	TL	HAKE, WHITE	TL
FLOUNDER, WINDOWPANE	TL	HALIBUT, ATLANTIC	TL
FLOUNDER, WINTER	TL	OCEAN POUT	TL
FLOUNDER, WITCH	TL	*POLLOCK*	*FL*
FLOUNDER, YELLOWTAIL	TL	*REDFISH, ACADIAN*	*FL*
WOLFFISH, ATLANTIC *	TL		

FL= FORK LENGTH; TL= TOTAL LENGTH * Atl. Wolffish *doesn't* require a length



If a measurement cannot be obtained for a catch item, the reviewer will include a comment that describes the reason. These data are only useful if the text used by reviewers is consistent. Below are common examples that result in degrees of difficulty for measuring a fish. If multiple issues exist please separate them with commas:

- Not placed on measuring strip/grid
- Missing frame
- Poor image quality
- Fish extending out of camera view
- Crew interference
- Inanimate object obstructing view
- Catch item curled
- Damaged or poor quality

Determining Species Weights and Sub-sampling Methods:

Discarded species weights will be determined either by length-weight conversion (LENGTH), tally count sub-sampling (TALLY), or visual estimates (VISUAL). There is work being done on four vessels to verify a volumetric sampling method. One vessel has been given an electronic scale (ACTUALELEC) to aid in obtaining actual weights to a basket volume. The specific annotation requirements for the volumetric sampling plan are outlined below, but should only be used on vessels participating in this data collection.

If a vessel is seen using another estimation method besides what is described in this document, a note should be made. If a weight cannot be collected by using one of these methods, the reviewer will report a count and use the UNKNOWN code and specify characteristics that led to this conclusion.

Length:

Fish that have a length measurement collected, the weight will be auto-generated based on Wigley et. al (2003).

Visual Estimate:

Fish that are not placed on the measuring strip, drop-offs, and any damaged fish will get a visually estimated weight. The weight recorded should represent what is seen, not what the fish would be whole or intact. If fish are not placed properly on the measuring strip, but an estimated length can be seen, use that estimated length to inform the visual estimate.

Tally:

When there is an overabundance of a regulated groundfish species that will not be kept from a given haul, the captain can elect to use one of the sub-sampling methods outlined below Reviewers need to understand these protocols so they can interpret what captains are doing and tailor their data to match the captain's preferred methods. Reviewers should follow the captain's lead and estimate lengths following the protocol selected by the captain. Each gear type is unique and there are gear specific sub-sampling methods (See pages 15-16).

A reviewer should not assume sub-sampling will occur based on what has previously occurred on the vessel. If there is an initial review and a flag can be added to the hauls that indicate sub-sampling will occur, the primary reviewer can mark fish discarded outside the measuring period as ESTMETHCD=TALLY. Fish discarded down the conveyor or fish that are unhooked at the rail can be marked this way. If an initial review is not completed, fish discarded outside the measuring period should be marked as ESTMETHCD=VISUAL and a visual weight entered.

ESTMETHCD=TALLY should be applied only when 20 or more length measurements are obtained per species per processing unit (i.e. haul, DCP unit, sub-trip). Regardless of the cause, such as glare or camera blocking for example, if there are less than 20 length measurements collected by the reviewer, the portion of lengths that could not be determined from the sub-sample will be added to the tallied fish and the reviewer will submit a visual estimate for the combined total. However, if 20 or more lengths are obtained and the captain continues measuring

and lengths could not be determined, that portion should be added to the total tally count for the sub-sampled species with an ESTMETHCD=TALLY.

> Example 1: The captain measures and lengths are obtained from 26 fish and then 78 fish are passed under the camera to be tallied. The tallied fish should be entered as UNIT_COUNT=78, ESTMETHCD=TALLY, wt left null. The total estimated weight will be calculated from the average individual weight of the 26 fish lengths multiplied by the total count of 104 fish.
>
> Example 2: The captain measures 20 fish and lengths are obtained from 18 fish because the reviewer could not confirm the length of **2** fish. After processing lengths, the captain passes **57** fish under the camera to be tallied. The total tally count should be entered as UNIT_COUNT=**59**, ESTMETHCD=VISUAL. The reviewer devises a visual estimate of 0.4 lbs per fish (59*0.4 lbs = 23.6 lbs) and enters a total weight of 24 lbs. The reviewer will use the appropriate event descriptor for the 2 fish that were measured but a length was undetermined.

If the reviewer feels not all individuals can be seen or made visible to the camera (ex: not moving skates or other fish around on conveyor), a Crew Event- Improper Catch Handling should be logged at the end of the haul along with a catch entry. If there is NO attempt to retain any individuals of the sub-sampled species for measurement a Crew Specific Event- Improper Catch Handling should be created.

Below are the gear-specific and species-specific sub-sampling protocols:

Trawl and Gillnet:

The captain/crew will collect all of the individuals of the species to be sub-sampled and keep them in camera view. From that species, the captain will randomly select at least 20 individuals and place these individuals on the measuring board following the standard measurement protocol. The remaining individuals will be passed under the camera at the measuring station in a manner that allows the reviewer to obtain an accurate count. At the end of the tally period, a catch entry should be made with the UNIT_COUNT filled out with the number tallied and ESTMETHCD=TALLY.

Longline:

During the haul, the captain/crew are allowed to ‘ping-off’ or unhook the species to be sub-sampled at the rail (sub-sampled fish are not retained and processed as required onboard gillnet and trawl vessels). The captain is choosing not to bring these fish onboard. Fish the captain attempts to gaff are not part of the sub-sample and should have an individual catch entry with a visually estimated weight. During the haul the captain will randomly select at least 20 individuals and place these individuals on the measuring board following the standard measurement protocol. Sub-sampled groundfish that are unhooked at the rail can be entered as a single catch entry at the end of the haul with the quantity discarded, LENGTH = null, DISPOSITION = 099 - DISCARDED, OTHER, and ESTMETHCD=VISUAL or TALLY.

The sub-sampled species are NOT considered to have a DISPOSITION = 043, as the captain is making the decision not to measure them because of their abundance. In regard

to high volume sub-sampling, species that are not brought onboard (DISPOSITION = 043), the reviewer will visually estimate the weight as they are not considered to be part of the sub-sample group.

In addition, if the reviewer is not able to obtain a length for 20 individuals of the sub-sampled species placed on the measuring board, the portion of the sub-sampled individuals without lengths will be recorded as ESTMETHCD=VISUAL.

Hake:

During the haul, the captain/crew will randomly collect 20 individuals from the combined spotted/red/white hake species group (dorsal-filament hakes) and retain them for measurement. The reviewer will create a catch entry and record the lengths under the species code of HAKE, RED/WHITE, MIX. The captain and crew are allowed to discard dorsal-filamented hake as long as all hake can be seen by the camera(s). The reviewer will collect a count of all dorsal-filament hake discarded (not including silver or offshore hake) and will create one catch entry of HAKE, RED/WHITE, MIX with the UNIT_COUNT filled out with the numbered tallied and ESTMETHCD=TALLY or VISUAL.

Electronic Scale:

A digital Marel scale is being used by one vessel in the Audit Model Program. This is to facilitate data collection for the volumetric sampling plan. **Please enter comments exactly as they are written here.** This will allow for easy querying. The captain is required to calibrate the scale once a day, before sampling occurs. Record each basket as a single annotation with ESTMETHCD=ACTUALELEC, DISPOSITION=099, UNIT_COUNT=NULL, enter the weight on the scale as the HAILWT, and enter in the basket fullness into the comments in this format **{V:*basket fill*}**. Record basket fill as a decimal (i.e. 0.25, 0.5, 0.75, 1). A count of the fish in the basket is NOT required. Confirm the species in the basket. Record <0.25 baskets or any remaining fish that are placed on the scale in the same manner as described above, but include a comment of **{V:0}.**

If another species is seen being discarded amongst the sub-sampled species, still record the basket weight as ESTMETHCD=ACTUALELECT, but subtract the visual weight of said fish from the scale weight and enter the difference as the HAILWT. An annotation for the 'other' fish should be made with ESTMETHCD=VISUAL and comment **'in *x* basket of *y* fish'**.

If Glare or any other issue (basket hangover, dirty camera, etc.) prevents the scale's screen from being seen, preventing a weight from being recorded, the appropriate event(s) should be made.

- Such events include CSE-Improper Catch Handling for any instance of being unable to read the digital screen due to basket hangover or CSE-Cameras Not Maintained for dirty cameras preventing data collection.

When the scale is not seen being calibrated, the weight can still be entered as ESTMETHCD=ACTUALELECT, but add the comment **'no calibration'** to the discard annotation. To assist with data queries, this comment should be within the entry, but outside the brackets indicating volume level.

When the basket is not seen being tared, the reviewer will subtract 3.5 lbs from the weight seen on the scale and enter that weight as the HAILWT and comment **'no tare'**. To assist with data queries, this comment should be within the entry, but outside the brackets indicating volume level.

If the scale is not used properly, for example not consistently calibrated or not tared to the basket, the data collected may not be used for the volumetric plan. The provider will need to work with the vessel to correct proper use of the scale. If the scale is not seen used, follow the Volumetric sampling protocols below.

Volumetric:

This sampling plan follows the trawl tally sampling method, but with specific comment requirements. Vessels will still need to measure at least 20 fish per species per haul as part of the sub-sampling protocols. The measured fish will be annotated as normal. The baskets will be annotated separately and as a TALLY. The comment should include the volume (0.25, 0.5, 0.75, 1) and *total* count of that basket. Enter the comment in this format: **{V:0.5;CT:35}**. Enter the comment in the TALLY entry. Remember to enter the UNIT_COUNT for the tally as the number counted AFTER fish are measured (if measuring occurs from said basket). The comment count should be total count from that basket (including any fish measured)

If the vessel measures <20 fish *OR* all the fish in a basket shown for volumetric, the reviewer will add a comment to the last fish measured stating the volume and count of that basket.

If fish from a <0.25 basket are processed, record discards how they are processed, either as a separate tally with a comment of **{V:0}** or length measurements.

If another species is seen being discarded amongst the sub-sampled species, annotate the tallied fish with the number of the other fish subtracted and the other fish will have a separate visually estimated entry.

Protocol for Grouping Discards into a Single Catch Entry:

Typically, reviewers will annotate discards as individual catch entries to account for the exact time the animal was identified and discarded during fishing operations. In addition to sub-sampling, there are five circumstances when a reviewer can group multiple discards of one species classification into a single catch entry (UNIT_COUNT >1). The following scenarios are common examples of when a reviewer will quantify multiple discards as a single species catch entry:

1. Any time a container of fish is discarded in one action, a single catch entry that represents identified species will be submitted with a total count entered in the UNIT_COUNT field. Discarded catch dumped from the container that cannot be classified to a regulated species will be counted and recorded as FISH, NK. Groundfish species that are identified should have a total count and a visually estimated weight assigned to each species catch entry.

2. During confirmed sub-sampling on longline trips, the species selected for sub-sampling that are discarded outside the measuring period (i.e. unhooked at the rail) can be entered as a single catch entry at the end of the haul.

3. Hake that are discarded without measuring during catch sorting (i.e. discarded down the conveyor or tossed out of the checker-pen) can be entered as a single catch entry. There may be CSE- Improper Catch Handling applied if VMP protocols are not followed (ex: if <20 hake are discarded on a haul, if no attempt to retain and measure hake is made on a haul, or if >20 hake are discarded but <20 were measured).

4. UNKNOWN KEPT OR DISCARDED: Fish that land on deck or fall off sorting tables/conveyors and are not recovered or picked up by crew cannot be confidently tracked. If multiples of the same species are observed landing on deck and cannot be tracked a reviewer can assign disposition code 900 to catch entries with a quantity > 1.

5. For trawl gear if multiple fish are washed overboard immediately following the end of the haul a single entry can be made. If multiple species are observed, a separate entry for each should be created with a tally count and estimated weight when applicable at the approximate end of the event.

Documentation of Fish Disposition:

This section gives guidance on how to assign a catch item a specific disposition or fate. These fish disposition codes mimic what NEFOP observers use to describe why fish are discarded. The disposition code will be entered in for each catch item under the DISPOSITION field of the EM Detail. A unique disposition code must be applied to each catch entry. The reviewer should make his/her best judgement as to which disposition code is best suited for the situation. The reviewer should never assume the disposition of a fish. For example, if a large groundfish is placed on the strip it should not automatically be coded as damaged or a LUMF. Check for signs of damage or indications by the captain that the fish is of less quality. The disposition codes can be found in Table 4.

Any catch item that does not show visible damage and is not kept by the vessel and is discarded will have a DISPOSITION recorded as 099- DISCARDED, OTHER. A length, a visual weight or tally count should be applied to the catch item. This disposition code will be the most commonly used code.

Fish sometimes come aboard in less than preferred market conditions or have been damaged in some way (predation, sand flea, gear, etc.). This categorization includes any legal sized groundfish that the vessel owner/captain elects not to retain because of poor quality as a result of damage (i.e. LUMF) *and* any damaged sub-legal fish. These 'poor quality' fish should be processed by captains in the same manner as regulated groundfish that cannot be kept due to size restrictions. If a poor quality catch item is identified, a visual weight will be obtained by the reviewer. The visually estimated weight should be representative of what the reviewer sees of the fish, not what the fish would weigh if it were whole. The DISPOSITION will be recorded as 031- POOR QUALITY for that catch entry. No length measurements should be recorded for any poor quality or damaged fish. Furthermore, damaged sub-legal groundfish should be separated from a tally count sub-sample; a visual estimate will always be assigned to poor quality groundfish regardless of size.

A common observation of EM reviewers are fish that interact with the gear but do not land on the deck of a vessel or are not handled by the captain/crew. These individuals are seen interacting with the fishing gear in a way that could affect their survival and thus warrant documentation by a reviewer. These fish should be given a DISPOSITION of 043- NOT BROUGHT ONBOARD, FELL OUT/OFF OF GEAR. Not Brought Onboard is defined as any fish that is entangled or caught in the gear with the intent of being landed or retained, but does not come in contact with the vessel and is assumed to be unaccounted for by the captain and therefore not included in the eVTR (i.e., drop offs). In most occurrences the catch entry will have a quantity equal to one, unless the discard event includes more than one fish that the reviewer can confidently group multiples of the same species into single catch entries. A visually estimated weight will always accompany fish that are identified as regulated groundfish. Fish with DISPOSITION = 043 do not require a CSE- Improper Catch Handling.

The disposition code (043) does NOT include fish that are momentarily handled at the rail and are dropped or escape/slip from hand; fish that make contact with the deck and are then washed overboard or out a scupper; fish that are unhooked at the rail by the captain; or fish that the captain attempts to gaff. Catch items such as these should have individual catch entries with DISPOSITION = 099- DISCARDED, OTHER. These fish have been seen by the captain and

therefore be included in the eVTR.

For catch items that the reviewer cannot determine the end status (kept or discarded) the DISPOSITION should be recorded as 900- UNKNOWN KEPT OR DISCARDED. Examples of this would be, but not limited to, fish that are left on deck and not physically discarded by the crew and not deemed as kept; fish seen on deck and then washed out of camera view; fish physically taken out of camera view and never seen by the reviewer being kept or discarded. A piece count and visual weight should be applied to the catch item(s). Identification to the lowest taxonomic classification is also required. If a catch item comes back into view and is observed discarded (discarded by crew, washes out of scupper, etc) the disposition will be updated to 099-DISCARDED, OTHER.

When a reviewer observes an Incidental Take (i.e. mammal, sea turtle, or sea bird) interact with any portion of the gear, regardless of its fate or condition (dead or alive, whole or in pieces) a catch entry should be made with the DISPOSITION of 052- INCIDENTAL TAKE (MAMMAL, SEA TURTLE, SEA BIRD).

Table 4: List of Fish Disposition Codes and Description

Code	Description
031	POOR QUALITY, REASON NOT SPECIFIED
043	NOT BROUGHT ON BOARD, FELL OUT/OFF OF GEAR
099	DISCARDED, OTHER
900	UNKNOWN KEPT OR DISCARDED
052	INCIDENTAL TAKE (MAMMAL, SEA TURTLE, SEA BIRD)

Event Documentation Standards:

Occasionally, certain events will diminish the ability to obtain information and decrease the value of collected data. There are specific event types that respond to haul level observations and other events that apply to trip level concerns. Currently, there are three event types that require documentation. An event can either be a point or duration. A point event is annotated at the "first sight" of the event. A duration event begins at the "first sight" of the event and ends once the event has been resolved or when the haul has ended, depending on event type. Overlap may occur for certain duration events that are documented at the haul level. Location information (collected in the timestamp) and detailed comments will be included with the event entry.

- Fishing Operations (Table 5)
- Crew Specific (Table 6)
- EM System Specific (Table 7)


```
"other_events": [
    {
      "event_category": "FISHING
OPERATIONS",
      "event_code": "BAG",
      "event_duration": "PT4H10M20S",
      "haul_id": 1,
      "event_datetime":
"2019-08-02T16:24:45.000Z",
      "event_lat": 42.123456,
      "event_lon": -67.123456,
      "reviewer_id": "X99",
      "comments": "string"
    }
  ]
```


Figure 4: Example of an Event annotation in JSON format.

Events are processed to document a variety of specific issues or concerns and will be used to further determine if data quality was jeopardized within a haul or at any time of the trip. It is important to distinguish event types and provide notation because events can assist in rapidly responding to system malfunctions or improve catch handling techniques. See Tables 5-7 for examples of specific event types. The frequency and duration of the stated examples can disrupt workflow and in extreme cases render haul or trip level data unusable.

Fishing Operations Events:

Fishing Operations events have the potential to increase review time, make discards hard to track, and they can be related to slipped or tripped bags of catch and weather related issues. Reviewers will annotate all FOE's as duration events and provide as much information as the reviewing software allows.

Table 5: Fishing Operations Event Descriptors

SLIPPED OR TRIPPED BAG	WEATHER INDUCED POOR VISIBILITY	OTHER OPERATIONS ISSUES

Slipped or Tripped Bag: In the trawl fishery, sometimes the contents of a tow are released in the water or the catch is not fully brought onboard. A **tripped bag** indicates that the captain/crew made an intentional effort to release catch from the codend by either cutting through a large section of meshes, by setting the net out again to release the contents after surveying the composition of the bag on deck or by forcing the codend open off the stern or sides of the vessel to avoid a high amount of bycatch. A tripped bag can result from heightened safety concerns , mechanical issues, or because the catch is not the intended target species. **Slipped catch** (or bag) is the unintentional loss of catch. The volume or amount of catch that is lost cannot be quantified in most cases and/or occurred out of camera view. An entry at the first sight of an issue should be made and the comments should include any observations regarding potential causes, such as sustained gear damage, mechanical failure, or potential safety hazards.. The reviewer will include a comment regarding the species composition of released catch that was not brought on deck and handled by the crew. Since a full account of the catch cannot be made (i.e. discards cannot be tracked confidently), the haul will be marked OBSERVED=N and no catch entries need to be made for fish seen in the water or falling from the gear.

Weather Induced Poor Visibility: During fishing operations, reviewers will note when weather events related to fog, high winds, sun glare, or precipitation reduce image quality and impact video review at the haul level. Typically, more than one camera is impacted. If the weather resolves during the trip and the cameras still have water on them a Crew Specific Event- Cameras Not Maintained would be annotated. This event does not include when the lens or dome cover is foggy or hazy due to damage. Video review that is impacted by a damaged camera or dome cover would fall under EMS-System Image Impairment.

Other Operation Issues: This descriptor is designated for operational events that do not align with event descriptions listed in the Fishing Operations Event category. Events that are inputted as 'Other' can be either a duration or point event. A reviewer should document any unusual event that disrupts operations and/or impacts review. Detailed comments should be provided to help explain the situation.

Crew Specific Events:

In order to have a functional EM program captains must follow their VMP. This includes being vigilant in keeping camera covers clean and clear of fish slime, water droplets, and/or encrusted salt spray and following the catch handling protocols. They are required to keep objects from obstructing camera views and must refrain from catch handling practices that disrupt the video analyst's ability to accurately collect data. Ensuring that these entries are made is critical as timely feedback is the only way to communicate to the captain's effectively (before a series of trips are recorded with undesirable conditions). Crew Events can be reported as either a duration event or as a singular-point event.

Table 6: Crew Specific Event Descriptors

CAMERA SYSTEM NOT MAINTAINED	CAMERA BLOCKING	IMPROPER CATCH HANDLING
BULK DISCARDING	IMPROPER DELAYED CATCH PROCESSING	OTHER CREW ISSUES

Camera System Not Maintained: Cameras must be inspected by vessel personnel throughout a trip. If any camera has water spots, fish slime, or anything on the lens and the reviewers ability to ID discards, collect lengths, or track activity on deck is directly impacted, an entry should be made. This duration event entry is documented at the haul level when review is first impacted by the appearance of the liquid or debris on the dome cover and continues until the affected camera view is no longer being used or is cleaned during the haul. This event may lead to a haul being reported as OBS=N if discards cannot be adequately tracked due to water spots, slime, debris, etc.

> Note: If camera(s) are impacted by weather, a CSE-CAMERA SYSTEM NOT MAINTAINED is not necessary. The FOE-WEATHER INDUCED POOR VISIBILITY should be annotated instead.

Camera Blocking: Once mobile gear is deployed or when a fixed gear vessel begins to retrieve gear, cameras must be maintained and routinely checked to ensure views are clear and unobstructed for the remainder of the trip. Partial or complete obstruction of a camera view(s) will be documented as a duration event anytime a camera is blocked and fishing activity has begun. The end points of the event will signify the beginning: *when the view was initially blocked* and, conclusion: *when the camera view became fully unobstructed*. Camera views that are periodically blocked throughout fishing operations (when gear is in motion or when unsorted catch is present on deck) will be documented if the reviewer could not validate VMP catch handling requirements or confirm the fate of catch items that were caught by the vessel.

> Note: Instances in which an object, hand, etc. is blocking any part of the fish and impacts the ability to record a length, it is documented as Improper Catch Handling.

Improper Catch Handling: Catch items (allocated and non-allocated species) that are not handled properly or any catch processing that is out of the purview of the vessel's VMP should be documented. This applies to any fish not properly handled, regardless of species classification (i.e. FISH NK entry made because cannot ID fish due to handling should also have an event made). These events can be annotated as either a point or duration, depending on the frequency. If Improper Catch Handling is documented 5 or fewer times during a haul the reviewer will use point events. If it occurs more than 5 times the reviewer will begin a duration event until either the issue is resolved, the haul ends, or all discards are processed. *In the instance when a duration event is annotated the prior point events do not need to be deleted.* If the vessel makes an attempt to properly place the fish on the strip (i.e. lays it flat multiple times, pulls hands away but fish curls up), no event is needed. The vessel is making a good faith effort but the fish is alive and hard to lay flat. Fish that are curved due to stiffness or rigor and are not straightened, an event should be created. The weight of the catch entry should be a visual estimate or via a sub-sample.

Examples of when to apply a CSE - Improper Catch Handling

1. If catch handling protocols are not followed when an observer is on board. Captain supposed to hand observer the laminated Information Sheet located on the vessel.
2. Discarding poor quality or damaged fish without proper placement on measuring strip

3. Allocated or regulated fish discarded down the conveyor without measuring, or picked out of checker-pen
4. Fish that are assigned as Fish NK because they are discarded either out of camera view or not at a designated control point described in their VMP
5. If a length cannot be collected due to part of the fish (nose and/or tail) being blocked by a hand or object.
6. The measuring strip is taken out of camera view during the measuring period
7. Fish not placed straight or flat on the strip due to stiffness or rigor.
8. If no attempt to retain a species for measurement is made (i.e. all are discarded during sorting), regardless of quantity.
9. If less than 20 fish of a species are measured and a tally by the vessel is performed
10. If the first 5 flounders of each species do not have both the blind and eyed sides presented to the camera.

Examples of when NOT to apply a CSE - Improper Catch Handling

1. For longline vessels when poor quality fish are unhooked or during sub-sampling and intact fish are unhooked.
2. Crew attempts to lay the fish flat and removes hands, but the tail keeps curling or the fish keeps moving and no length is obtained.
3. Fish annotated with DISPOSITION = 043 NOT BROUGHT ONBOARD

Bulk Discarding: Refers to any action where a container of fish is dumped overboard or when catch that is piled or layered on deck is swept or shoveled overboard during video review and the contents cannot be confirmed as a groundfish or non-groundfish species. The distinction between a pile and single layer should be made. Fish discarded in a single layer can be tracked and accurately counted, and would not constitute an event. When fish are in containers or in piles, the fish mixed in or at the bottom cannot be observed, counted, or properly accounted. If fish cannot be verified for whatever reason a bulk discarding event should be documented.

A catch entry associated with the event will provide an actual or estimated count of the unidentifiable discarded contents:

FISH, NK, UNIT_COUNT > 1
DISPOSITION= DISCARDED, OTHER (099)
ESTMETHCD = UNKNOWN

The count should include all items that cannot be identified as either groundfish or non-groundfish. Obvious non-groundfish species (skate, dogfish, monkfish, crustaceans) do not need to be included, unless their ID is inhibited in some way. However if image quality impacts the clarity of the image and only general shapes and colors can be seen, all items should be counted. Comments for the catch entry will indicate the species composition of the discarded pile. Bulk discarding is a point event annotated at the first sight of the discarding. Detailed comments within the event should fully describe the situation.

Other events may impact a reviewer's ability to verify piles of catch resulting in a Bulk Discarding event. It is important to include all events so the entire picture can be captured. Examples of event descriptors that could prompt Bulk Discarding include Cameras Not Maintained, Camera Blocking, Glare, Weather, etc.

Examples of Bulk Discarding:

1. Contents of the codend are dumped in a pile on deck then swept overboard by gear or crew and the contents cannot be identified or verified as only non-groundfish.
2. Contents within a checker-pen that has been moved to one corner or remains scattered in small piles on deck are then shoveled overboard and the contents cannot be identified or verified as exclusively non-groundfish.
3. Tote/container of unknown fish is dumped over.

Examples of NOT Bulk Discarding:

1. Throughout the haul, verified non-groundfish are pushed to a corner or side of a checkerpen by a crewmember and then discarded in one action.
2. Fish discarded in a single layer that can be tracked and counted.
3. A mound or pile of catch that is separated into a single layer before discarding.
4. Tote/container of confirmed non-groundfish is discarded.
5. Tote/container of confirmed guts and no whole fish is discarded.

Improper Delayed Catch Processing: This event should be annotated when a reviewer sees a vessel not properly carrying out the Delayed Catch Processing protocols listed in their VMP. This includes instances when a vessel has enacted DCP but they are not retaining all groundfish discards throughout hauls documented as DCP and when the vessel is not retaining discards within the designated area/or discards are stored out of camera view during DCP period.

Other Crew Issues: This descriptor should only be used if the event does not fit one of the above scenarios. Detailed comments should be provided to help explain the situation. This event can be either point or duration, the determination is to be made by the reviewer.

EM System Specific Events:

EM System Specific events reflect failures in the EM camera system and can result in loss of video and data. These events can be documented at any point in a trip, regardless of fishing activity or potential impacts to review. EM System Events include when there are video or sensor gaps, camera(s) or system failure, when the EM system is not activated prior to departure or if it is shut off prior to landing, out of synced camera. The event is created at the first sight of an issue, with the appropriate descriptor attached and ends when the event concludes or is resolved. Include any comments that may help to explain the situation.

Table 7: EM Specific Event Descriptors

SENSOR GAPS	VIDEO GAPS	CAMERA FAILURE
SYSTEM FAILURE	CAMERAS OUT OF SYNC	CAMERAS OUT OF POSITION
SYSTEM NOT ACTIVATED	SYSTEM TURNED OFF	MEASURING SURFACE

AT DOCK	PRIOR TO LANDING	VISIBILITY
SYSTEM IMAGE IMPAIRMENT	NIGHTTIME SYSTEM IMAGE IMPAIRMENT	OTHER SYSTEM ISSUES

Sensor Gaps: If at any point during a trip, the GPS or other sensors are not functioning, an event should be created. The event should encompass the entire time the sensors are not functioning. Comments should be made describing what type of sensor and the impact to the review, if any.

Video Gaps: If any video is missing at any point in a trip, regardless of duration or number of cameras affected, an event entry should be made. The event should encompass the entire time there are gaps. Comments should be made describing any impact to the review. Hauls that could not be successfully reviewed will be recorded as OBSERVED = N. Gaps refer to when the video goes out but then comes back on at some point in the trip. If video remains out, document it as a Camera Failure.

Camera Failure: If video from one (1) or more camera(s) but not all stop recording and no image is seen and persists for the duration of the trip an entry will be made. This event signifies that the camera was lost for the duration of the trip. The comments should include which camera(s) failed and what was seen when the cameras went out. If the reviewer could not successfully observe the haul, the haul will be recorded as OBSERVED = N.

System Failure: If at any point during a trip, the complete EM system (all cameras and all sensors) fails and stops operating, an event should be made with comments stating the situation. The event should encompass the entire time the system is not functioning. Detailed comments should be included in the event entry.

Cameras Out of Sync: If at any point during a trip the cameras are no longer in sync with each other, an event should be created. Cameras are out of sync when images are more than 5 seconds apart. The event should encompass the whole time the cameras are not synced to each other.

Measuring Surface Visibility: When non-weather related issues impact the measuring surface visibility and data collection is impacted. This can be caused by poor lighting that causes glare or shadows on the strip. These events can be annotated as either a point or duration, depending on the frequency. If the measuring surface is impacted 5 or less times during a haul the reviewer will use point events. If it occurs more than 5 times the reviewer will begin a duration event until either the issue is resolved, the haul ends, or all discards are processed. In the instance when a duration event is annotated the prior point events do not need to be deleted.

Cameras Out of Position: If at any point during the trip, one or more cameras are knocked out of position (i.e. view is not identical to VMP or the reviewer observes the camera being hit and knocked out of place), an event should be created. The event should encompass the whole time the cameras are not positioned correctly. The event may span several hauls if no corrective action is taken. If vessel personnel or an outside technician corrects the camera position the event would end. Detailed comments on which cameras were affected should be added to the event entry.

Note: Cameras mounted on booms must be positioned correctly once the vessel arrives on the fishing grounds.

System Not Activated at Dock: The EM system is required to be operational for the duration of the trip (departure from dock to landing at a dock). If the video for a trip starts while the vessel is already underway an event entry should be made when the system begins recording video. Event comments will include what the reviewer sees when the video began and if any fishing activity occurred. This is a single point event and should be made when the video is first seen.

The EM Provider must determine the reasons for delayed activation of the system. Comments related to the causes will be included with the event in addition to other reporting sources such as work logs or portal entries.

System Turned Off Prior to Landing: The EM system is required to be operational for the duration of the trip (departure from dock to landing at a dock). If the system is turned off prior to landing, an event entry should be made that includes comments on the approximate location of the vessel and if there was unsorted catch or crew present on deck at the time of the cameras being lost. This is a single point event and should be made when the video cuts out. If unprocessed kept catch from multiple hauls is present on deck or if catch processing is still occurring when the system is turned off the trip could result in a failure. Multiple hauls could potentially be recorded as OBSERVED = N. Under these circumstances the provider must provide access to the video prior to submitting the trip. Reviewers must comment on what was taking place when the system was turned off.

System Image Impairment: This refers to when the image has any issues that are caused by the EM system. This includes out of focus images, melting/running images, pixelated images, or a decrease in image quality due to poor lighting, not caused by nighttime activity. Damaged dome covers also fall under this event. See below for details on what impairs an image.

Out of Focus: Camera views or viewer screens should provide clear and unblemished images. Reviewers will assess camera views at the haul level and views that are blurry due to being out of focus and do not meet the manufacturer's quality standards must be documented, regardless of impact. Causes can include lens damage such as pitting or scratches, condensation in the lens or dome, as well as a general loss of clarity.

Example of Out of Focus

1. If after examining the VMP still images the camera does not match the supplied view and it is not due to water, salt, or slime.

Not an example of Out of Focus

1. If a camera is not maintained and water spots, dried salt spray, or fish slime are observed on the camera(s). This would result in a CSE - Camera System not Maintained

Glare: Reviewers will document glare whenever video of fishing operations is impeded by the presence of sharp-bright light or sun glare. This should be included when the primary camera(s) used by the reviewer are affected by glare or if glare directly impacts species identification or catch handling.

Note: In the trawl fishery the primary camera changes throughout the haul. Examples include, but are not limited to: if glare is impacting the view of the net reels or stern during haulback and fish cannot be tracked; during catch sorting

when discards cannot be tracked or identified.

Poor Lighting: Reviewers will document poor light conditions whenever video of fishing operations is affected by shadows or otherwise a lack of light that produces darker images of activity or fish.

Pixelization: The reviewer will document video that has lost clarity as a result of pixelated images, defined as: The appearance of individual pixels and/or pixel blocks causing the individual pixels making up the image to become more prominent, thus causing a grainy appearance in the image.

Melting/Running: When the image colors blend and run together. The image appears to be melting down the screen.

Night-Time System Image Impairment: This event is specific for night time hours when fishing activity is occurring and the reviewer cannot see what is going on. This includes all the examples listed above, but will also include instances in which deck lights are either nonexistent or insufficient for tracking fish.

Other System Issues: This descriptor should only be used if the event does not fit one of the above scenarios. Detailed comments should be provided to help explain the situation. This event can be either point or duration, the determination is to be made by the reviewer.

Protected Species Interactions:

If at any time during an EM trip a marine mammal, sea turtle, or sea bird, regardless of condition, directly contacts the vessel, or the vessel's fishing gear and any part of the animal is entangled, snagged, ensnared, caught, hooked, collided with, hit, injured or killed by the vessel or its gear, regardless of the final condition and release of the animal, it should be reported as an incidental take. The animal could be alive or dead, whole or a skeleton/pieces of bone. The 75% articulated skeleton NEFOP rule does not apply to EM INC take annotations. All interactions should be annotated. The INC take staff at the Center will make the final determination of the incidental take. The primary reviewer is not required to identify the animal to species; only to mark the interaction (presence/absence). At the first sight of the animal, a discard entry of WHALE, DOLPHIN, SEAL, TURTLE, or BIRD NK, DISPOSITION = 052 INCIDENTAL TAKE, UNIT_COUNT=1, ESTMETHCD= UNKNOWN should be made. Each animal observed should have an individual entry and timestamp. These cannot be grouped together, even if interaction is observed at the same time. This will create a timestamp that will allow Center staff to view the clip at a later date and collect more detailed information on the take for the Protected Species Branch at the Center.

Individual Animal Documentation:

EM vessels are not required to follow specific catch handling protocols for species which typically are recorded on individual animal logs (i.e. sharks, tuna, rays, sturgeon, etc.). This protocol is consistent with ASM procedure. If an individual animal is caught during any EM trip, reviewers will document the event and create a discard entry. A length and weight estimates and identification to species are not required for these interactions. These cannot be grouped together, even if interaction is observed at the same time. A catch entry of either SHARK, RAY, STURGEON, SWORDFISH, or TUNA, NK DISPOSITION = 099 DISCARD OTHER, ESTMETHCD=UNKNOWN should be made at the first sign of interaction. There may be cases in which an Individual Animal species does not have a corresponding code in the review software, if this occurs document the animal as FISH, NK and include detailed comments in the entry.

Appendix A: General Definitions:

Exempted Fishing Permit (EFP):

An EFP is a research proposal submitted by a principal investigator to the NMFS. The proposal is reviewed by NMFS and must be authorized by the Regional Administrator. If the proposal is approved it becomes a contractual agreement between stakeholders. The legally binding document lists vessel participants and outlines the boundaries of the experimental fishing activities permitted in accordance with the Magnuson-Stevens Fisheries and Conservation Management Act. The exemptions, conditions, and requirements that are documented in the EFP are depicted in the Vessel Monitoring Plan. A copy of the EFP must be carried onboard the vessel at all times.

Vessel Monitoring Plan (VMP):

EM service providers are tasked with completing Vessel Monitoring Plans uniquely designed for individual vessel's participating under any EM program, including Exempted Fisheries Permit in the Northeast Groundfish fishery. The VMP is an essential document that serves as an operations manual for a given vessel that the captain and crew must adhere to whenever they are assigned EFP coverage. The VMP describes how fishing operations on the vessel will be conducted and how the EM system and associated equipment will be configured to successfully monitor fishing activity. The VMP will contain detailed information pertaining to the vessel layout, catch handling processes, vessel information and operations outline, EM equipment set-up, contact information, and EM system malfunction.

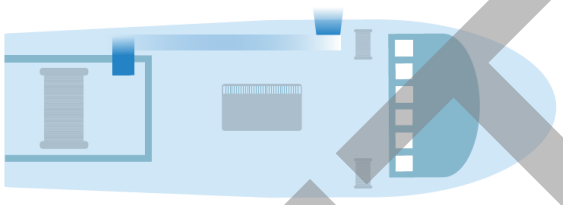
With guidance from federal agencies, the EM vendor will collaborate with individual vessel participants to ensure that the VMP is structured to minimize error and data loss. Prior to operating in the groundfish fishery with EM activated in lieu of an at-sea monitor, VMPs must go through an approval process by GARFO and TDQ.

Annual Catch Entitlement (ACE):

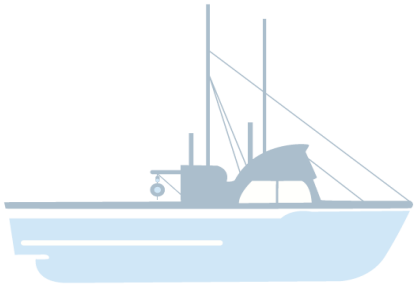
Annual Catch Entitlement with respect to the NE multispecies fishery, means the share of the annual catch limit (ACL) for each NE multispecies stock that is allocated to an individual sector operator or state permit bank based upon the cumulative fishing history attached to each permit participating in that sector or held by state-operated permit bank in a given year. This share may be adjusted due to penalties for exceeding the sector's ACE for a particular stock in earlier years, or due to other violations of the Fishery Management Plan (FMP), including the yearly sector operations plan. When a sector's or state operated permit bank's share of a NE multispecies stock, as determined by the fishing histories of the vessels participating in that sector or permits held by the state-operated permit bank, is multiplied by the available catch, the result is the amount of ACE (live weight pounds) that can be harvested (landings and discards) by participants in that sector or transferred by a state-operated permit bank during a particular permit year.

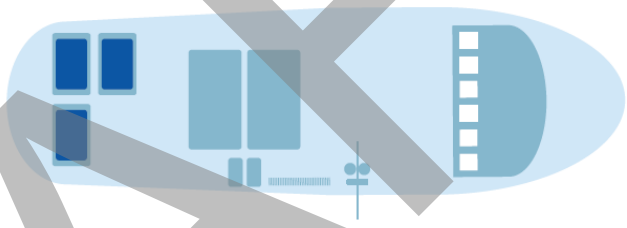
Appendix B: Generic schematics of vessel layout

Trawl

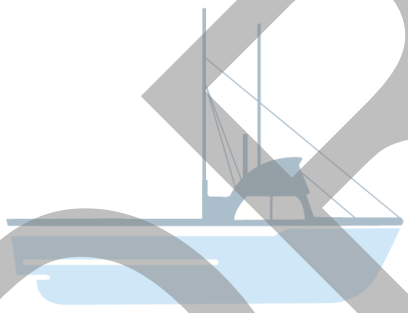


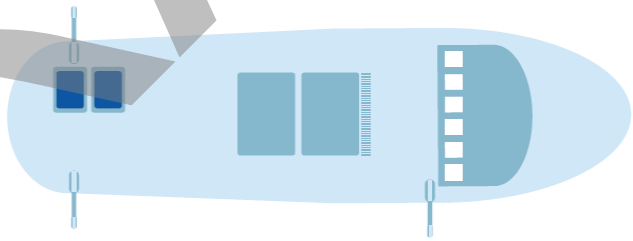
Longline



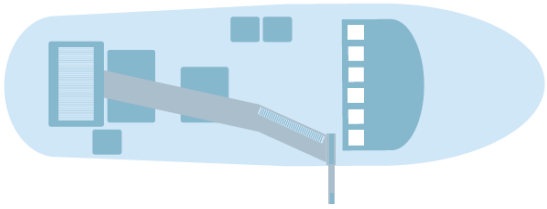


Handline/Jig





Gillnet



Appendix C: Primary Species Characteristics

Atlantic cod

- Speckled greenish-brown or reddish coloration
- Three dorsal fins
- White lateral line
- Prominent chin barbel

Pollock

- Solid blue gray dorsal color that fades to white along ventral surface
- White lateral line
- Three dorsal fins

Haddock

- Black lateral line
- Dusky black patch located above and behind pectoral fin
- Three dorsal fins

White hake

- Body rounded in front of vent
- Second dorsal and anal fin extend to tail stock
- Pelvic and dorsal fin rays present
- Pelvic fin rays do not reach vent

Acadian Redfish

- Body flame red
- Stout spines
- Bass or perch-like appearance

Windowpane flounder

- Left eyed
- Black and white spots on dorsal, anal, and caudal fins
- Ventral view body appears translucent
- Round overall body shape with pointed snout

American plaice flounder

- Right eyed, with large mouth
- Plain coloration
- Narrow caudal peduncle
- Rounded tail

Witch flounder

- Right eyed
- Upper side brown color often with black hue and dark margins along anal and dorsal fins
- Dark/black tipped pectoral fins
- Thin bodied

Winter flounder

- Thick bodied with light ventral side
- Small mouth
- Convex tail, thick caudal peduncle
- Right eyed

Yellowtail flounder

- Yellow mottled coloration on dorsal surface
- Protruding, upturned snout (dorsal side)
- Small mouth
- Convex tail

Atlantic halibut

- Right eyed
- Diamond shaped body
- Concave tail
- Underside white

Ocean pout

- Long slender body
- Broad, heavy head and large fleshy lips
- Long dorsal fin
- Rounded pectoral fin

Atlantic wolffish

- Bluish, gray color with broad dark bars covering length of body
- Large head with blunt snout
- Long dorsal and anal fins
- White underside

The following section illustrates identification characteristics of non-regulated finfish that are common bycatch in the Northeast groundfish fishery and also hold market value. Occasionally, a captain or crew member will present and process these fish on the measuring board. The video reviewer should account for every catch item that is passed across the measuring strip within camera view.

Fourspot flounder

- Left eye
- Four distinct ocelli present on dorsal surface
- Large mouth
- Ventral view appears translucent

Red hake

- Dorsal surface brownish to bronze
- Pelvic and dorsal fin rays present
- Body rounded in front of vent
- Pelvic fin rays do reach or slightly pass vent

Silver/Offshore hake

- Lower jaw projects beyond upper
- Wide mouth (sharp teeth may be visible)
- Dark gray dorsal surface but most of the body is silver in color

Summer flounder

- Left eye
- Many ocelli present on dorsal surface
- Large mouth
- Robust tail

Appendix D: Minimum Sizes for Commercial Groundfish Species

Groundfish Minimum Fish Sizes

Species	Size (cm)
Witch flounder	33 (13 in)
Yellowtail flounder	30.5 (12 in)
American plaice flounder	30.5 (12 in)
Winter flounder	30.5 (12 in)
Redfish	17.8 (7 in)
Haddock	40.6 (16 in)
Pollock	48.3 (19 in)
Atlantic cod	48.3 (19 in)
Atlantic halibut	104 (41 in)
White hake	No minimum size

Appendix E: Electronic Monitoring EM Detail JSON Technical Requirements

Description:	**Trip review object**	
report_id	integer; Used only when re-submitting an EM review.	
vessel_permit_ number*	integer; The fishing vessel permit number.	
	example: 222222	
vessel_name*	string; The name of the fishing vessel	
date_sail*	string; Date the trip left the dock in ISO1806 standard datetime format	
	example: 2019-05-31	
date_land*	string; Date trip returned to dock in ISO1806 standard datetime format	
	example: 2020-06-01	
evtr_num*	integer; Electronic Vessel Trip Report serial number (formerly trip_id)	
	example: 12345619010102	
total_hauls*	integer; The total number of hauls that occurred during the trip.	
	example: 9	
reviewed_hauls*	integer; The number of hauls reviewed.	
	example: 9	
observed*	string; Was the entire trip observable dock to dock?	
	Array [Y, N]	
comments	string; Notes pertaining to this trip or EM review.	
hauls	**description:**	**Haul object for each haul of this trip**
	haul_id*	integer; Ordinal number of the haul within the trip.
		minimum: 1
		example: 1
	haul_begin_ datetime	string($date-time); In ISO1806 standard datetime format
		example: 2019-08-02T16:24:45.000Z
	haul_begin_lat	number($double); Latitude in decimal degrees

		minimum: 0
		example: 42.123456
	haul_begin_lon	number($double); Longitude in decimal degrees
		maximum: 0
		example: -67.123456
	haul_end_ datetime	string($date-time); in ISO1806 standard datetime format
		example: 2019-08-02T16:24:45.000Z
	haul_end_lat	number($double); Latitude in decimal degrees
		minimum: 0
		example: 42.123456
	haul_end_lon	number($double); Longitude in decimal degrees
		maximum: 0
		example: -67.123456
	observed*	string; Was the haul fully observed?
		Array [Y, N]
	delayed_catch_ processing *	string; Was catch processing delayed on this haul?
		Array [Y, N]
	gear_category*	string; See Reference Table 1
	haul_id*	integer; Indicates the haul from which this discard resulted, if known.
	species_common_ itis*	string; See Reference Table 2
		example: COD, ATLANTIC
	species_code_itis*	integer; See Reference Table 2
		example: 164712
	weight	number; Weight of the discard.
		example: 1.5
	catch_weight_uom	string; Unit of measure used when estimating the weight of the discard.
	length	integer; Length of discard.

		example: 12
	catch_length_uom*	string; Unit of Measure used to measure discard.
	count	integer; Number of discards this record represents.
	weight_determined_by*	string; How was weight of discard estimated? See Reference Table 3
		example: LENGTH
	discard_datetime*	string($date-time); The date and time the discard occurred in ISO1806 standard format.
		example: 2019-08-02T16:24:45.000Z
	discard_lat*	number($double); Latitude in decimal degrees
		minimum: 0
		example: 42.123456
	discard_lon*	number($double); Longitude in decimal degrees
		maximum: 0
		example: -67.123456
	disposition*	string; See Reference Table 4.
	reviewer_id*	string; Official Observer ID assigned by TDQ to the reviewer.
		example: X99
	comments	string; Notes that are specific to understanding this discard record.
	event_category*	string
		Array [FISHING OPERATIONS, CREW, EM SPECIFIC]
	event_code*	string; See Reference Table 5.
	haul_id	integer; The haul within this event occurred, if known.
	event_datetime*	string($date-time); Timestamp in ISO1806 standard format.
		example: 2019-08-02T16:24:45.000Z
	event_lat*	number($double); Latitude in decimal degrees
		minimum: 0
		example: 42.123456

	event_lon*	number($double); Longitude in decimal degrees
		maximum: 0
		example: -67.123456
	reviewer_id*	string; Official Observer ID assigned by TDQ to the reviewer.
		example: X99
	comments	string; Notes that are specific to understanding this event.

Reference Table 1 – Gear Types - Groundfish

ACCSP_ GEARCATCD	ACCSP_CATEGORY_NAME	ACCSP_ TYPECD	ACCSP_TYPE_NAME
000	NOT CODED	000	NOT CODED
091	OTTER TRAWLS, BOTTOM	004	TRAWLS
200	GILL NETS	006	GILL NETS
400	LONG LINES	008	LONG LINES
700	HAND LINES	013	HAND LINES

Reference Table 2: Species List - Groundfish

NESPP4	COMMON_NAME	SCIENTIFIC_NAME	SPECIES_ITIS
0818	COD, ATLANTIC	GADUS MORHUA	164712
1200	FLOUNDER, WINTER	PLEURONECTES AMERICANUS	172905
1220	FLOUNDER, WITCH	GLYPTOCEPHALUS CYNOGLOSSUS	172873
1230	FLOUNDER, YELLOWTAIL	PLEURONECTES FERRUGINEUS	172909
1240	FLOUNDER, AMERICAN PLAICE	HIPPOGLOSSOIDES PLATESSOIDES	172877
1250	FLOUNDER, WINDOWPANE	SCOPHTALMUS AQUOSUS	172746
1477	HADDOCK	MELANOGRAMMUS AEGLEFINUS	164744
1520	HAKE, RED	UROPHYCIS CHUSS	164730

1539	HAKE, WHITE	UROPHYCIS TENUIS	164732
1551	HAKE, RED/WHITE MIX[1]	UROPHYCIS SP	164729
1590	ATLANTIC HALIBUT	HIPPOGLOSSUS HIPPOGLOSSUS	172933
2400	REDFISH, ACADIAN	SEBASTES FASCIATUS	166774
2500	OCEAN POUT	MACROZOARCES AMERICANUS	630979
2695	POLLOCK	POLLACHIUS VIRENS	164727
5121	WOLFFISH, ATLANTIC	ANARHICHAS LUPUS	171341
5260	FISH, NK	OSTEICHTHYES	161030
3591	SHARK, NK	SQUALIFORMES	159785
4212	STURGEON, NK	ACIPENSERIDAE	161064
4328	SWORDFISH	XIPHIAS GLADIUS	172482
4657	TUNA, NK	EUTHYNNUS THUNNUS SP	172418
6753	RAY, NK	RAJIFORMES	160806
6100	BIRD, NK	AVES	174371
6994	SEAL, NK	PHOCIDAE	180640
6997	DOLPHIN, NK (MAMMAL)	DELPHINIDAE	180415
6999	WHALE, NK	CETACEA, WHALE	180403
8160	TURTLE, NK	CHELONIOIDEA	173749
5270	VERTEBRATES, UNCLASSIFIED	VERTEBRATA	331030

[1] HAKE, RED/WHITE MIX: the reviewer should aggregate all unidentifiable hake (i.e., red, white, and spotted) discards and report them under “HAKE, RED/WHITE MIX”.

Reference Table 3 – Discarded Fish Weight Determined By [2]

Code	Weight Determined By
15	LENGTH
06	VISUALLY ESTIMATED
11	ACTUAL, ELECTRONIC SCALE
05	TALLY
03	BASKET/TOTE COUNT
00	UNKNOWN

[2] Discarded Fish Weight Determined By: when selecting UNKNOWN, the reviewer will report a count, but no weight (value will be null); when selecting VISUALLY ESTIMATED or ACTUAL, ELECTRONIC SCALE, the reviewer will report both a count and a weight.

Reference Table 4 – Fish Disposition Codes and Descriptors

Code	Description
031	POOR QUALITY, REASON NOT SPECIFIED
043	NOT BROUGHT ON BOARD, FELL OUT/OFF OF GEAR[3]
099	DISCARDED, OTHER
052	INCIDENTAL TAKE (MAMMAL, SEA TURTLE, SEA BIRD)
900	UNKNOWN KEPT OR DISCARDED

[3] Not Brought Onboard: defined as any fish that comes in contact with the gear with the intent of being landed or retained, but does not come in contact with the vessel and is assumed to be unaccounted for by the captain and therefore not included in the eVTR (i.e., drop offs).

Reference Table 5: Event Categories, Descriptions and Codes

EVENT_CAT	EVENT_DESC	EVENTCD
CREW	CAMERA SYSTEM NOT MAINTAINED	CAMMAINT
CREW	CAMERA BLOCKING	CAMBLOCK
CREW	BULK DISCARDING	BULKDISC
CREW	OTHER	OCI
CREW	IMPROPER CATCH HANDLING	ICH

CREW	IMPROPER DELAYED CATCH PROCESSING	IDCP
EM SPECIFIC	SYSTEM FAILURE	SYSTEM
EM SPECIFIC	CAMERA FAILURE	CAMFAIL
EM SPECIFIC	SENSORS GAPS	SENSGAP
EM SPECIFIC	VIDEO GAPS	VIDGAP
EM SPECIFIC	MEASURING SURFACE VISIBILITY	MEASVIS
EM SPECIFIC	OTHER	OSI
EM SPECIFIC	CAMERAS OUT OF SYNC	COS
EM SPECIFIC	SYSTEM NOT ACTIVATED AT DOCK	NAATDOCK
EM SPECIFIC	SYSTEM TURNED OFF PRIOR TO LANDING	SYSOFFPRIOR
EM SPECIFIC	CAMERAS OUT OF POSITION	CAMKNOCK
EM SPECIFIC	SYSTEM IMAGE IMPAIRMENT	IMGIMPAIR
EM SPECIFIC	NIGHTTIME IMAGE IMPAIRMENT	NIGHTIMPAIR
FISHING OPERATIONS	OTHER OPERATIONS ISSUES	OOI
FISHING OPERATIONS	SLIPPED OR TRIPPED BAG	BAG
FISHING OPERATIONS	WEATHER INDUCED POOR VISIBILITY	WEATHER

Appendix F: Month determination for Length/Weight Conversions formula for each Species

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Atl. Cod	W	W	W	S	S	S	S	S	S	A	A	A
Haddock	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	A	A	A
Pollock	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	A	A	A
Acadian Redfish	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A
White Hake	W	W	W	S	S	S	S	S	S	A	A	A
Am. Plaice Fld.	W/A	W/A	W/A	S	S	S	S	S	S	W/A	W/A	W/A
Winter Fld.	W	W	W	S	S	S	S	S	S	A	A	A
Witch Fld.	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	A	A	A
Yellowtail Fld.	W	W	W	S	S	S	S	S	S	A	A	A
Atl. Halibut	A	A	A	S	S	S	S	S	S	A	A	A
Atl. Wolffish	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A
Ocean Pout	W/A	W/A	W/A	S	S	S	S	S	S	W/A	W/A	W/A
Windowpane Fld.	W	W	W	S	S	S	S	S	S	A	A	A

W=Winter, S=Spring, A=Autumn

References:

Wigley, S.E., McBride, H.M. and McHugh, N.J., 2003. Length-weight relationships for 74 fish species collected during NEFSC research vessel bottom trawl surveys, 1992-99.

Version History:

Release Date	Description of Edits	V.
6/10/17	DRAFT 1	1
10/17/17	DRAFT 2	2
11/28/2017	FINAL DRAFT	3
10/25/18	DRAFT 3: Haul definitions, longline subsampling protocols	4
7/17/19	DRAFT 4: Hake subsampling protocols, EM specs updates, adding in MREM protocols	5
9/17/19	Addition of "Other Gear" haul definition	6
10/9/19	Addition of Water Tows definition and guidance	7
11/4/19	Reviewed and Observed field guidance	8
2/5/20	Correction to discard_condition for pinged-off fish on Longline vessels	9
4/16/20	Defining split gillnet haul, additional jig hauling guidance, FY2020 changes: event/image quality clarifications and examples, catch handling metrics, EM Detail JSON; adding fish disposition codes, changing codes to ACCSP/ITIS, longline protocols finalized	10
6/9/2020	Change to sub-sample number from 30 to 20 fish per haul	11
7/17/20	Addition of Jig SET_START def; Made haul elements optional for submission when a comment is present; EM-MSV descriptor better defined; VQE-Weather descriptor better defined.	12
8/28/20	Addition of Gear Type definitions; Addition of general vessel schematics	13
10/27/20	Addition of Review Start/Stop definitions; removal of discard annotation for FOE-Slipped/Trip Bag; revisions to several event descriptors	14
1/29/21	Addition of Volumetric/Elec Scale sub-sampling methods for four vessels only.	15
3/22/21	FY2021 Data Element Changes	16